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16 JUN 93
Econ 5972
Dr. Beaumont

CROWDING OUT IN AN INTEGRATED WORLD CAPITAL MARKET

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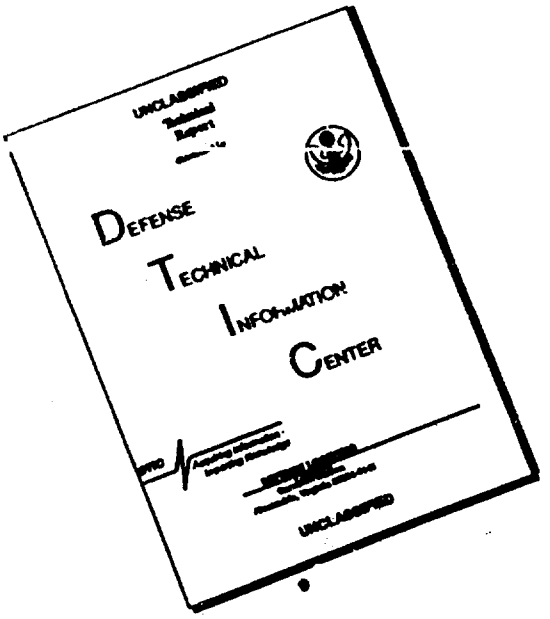

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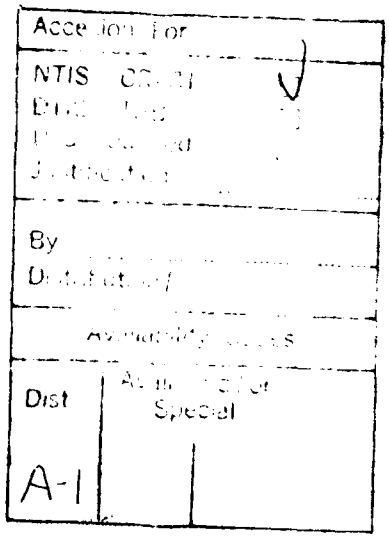

Purpose: Extended Master's Paper written to satisfy the requirements of Economics 5972.

Subject: The Crowding Out Effect from fiscal deficits and econometric analysis using an integrated world capital market framework. The scope of the study is from 1970 to 1990 using quarterly data from the United States, Germany and France.

Committee: Dr. Paul M. Beaumont (chairman), Dr. Stefan C. Norrbin, and Dr. James H. Gapinski.

Data Sources: Citibase, International Financial Statistics (IFS), and the Organization for Economic Co-operation and Developement (OECD).

I. INTRODUCTION

This Extended Master's Paper extends the paper "West German Fiscal Deficit: Effects on Economic Activity" which I wrote under the direction of Dr. Gapinski for Econ 5205. That paper used regression analysis to try to determine the relationship between fiscal deficits or surpluses and interest rates, investment and the balance of trade over the twenty year period from 1970 through 1989.

Regression analysis in the original paper provided strong evidence for the correlation between running a fiscal deficit and having a trade deficit, commonly referred to as "twin deficits". Using the Micro TSP software package, I regressed the dependent variable of the trade deficit, or surplus, on the independent variables of the fiscal deficit, the money supply and a lagged dependent variable. The regression was significant at higher than the one percent level and with a high R-squared of over 0.95. There was the expected positive coefficient on the deficit and the t-statistic confirms it was highly significant.

Another regression was done in order to determine the effect of the deficit on investment using gross fixed capital formation as the dependent variable. The results were fairly impressive with a very high R-squared and F statistic. Unfortunately, however, most of the explanatory power in the regression came from the lagged dependent variable and the money supply. It seemed clear that the

deficits had some effect on investment through "crowding out", but the whole story could not be seen.

The next four regressions were all attempts to determine the deficit's impact on interest rates. Three different interest rate measures were used in the regressions: the interest rate on three month Treasury bills, government bond yield, and the real rate of interest on the Treasury bills corrected for inflation. The results of the regressions were quite disappointing. I was unable to achieve an R-squared greater than 0.54, and the coefficients on the deficit and money supply were often the opposite of what was expected. The countertheoretical coefficients and t-statistics, which were all very low except for the lagged dependent variable, indicated a random walk in interest rates at best.

Due to the poor results, I concluded that determining the relationship between deficits and interest rates was quite complex and beyond the scope of the assignment. My extended Master's paper is a further investigation into the question of deficits, interest rates and crowding out. The first step is to ask, "Why is it that we should expect deficits to affect interest rates and investment?", and then to proceed with a theory to explain this relationship.

The organization of the rest of this paper is as follows: section two is the literature review of several articles on crowding out, section three is where all my empirical analysis is presented, and section four is the

conclusion. The two appendices are found after the bibliography and contain the regression output and a data section.

II. LITERATURE REVIEW

There is more than one theory of how interest rates are determined. From the vast amount of literature on the subject, several different concepts are presented along with modifications and simplifications for empirical testing. It is through the rise in interest rates that crowding out of private investment is ultimately manifested. How interest rates are affected by deficits and other factors, such as real money supply, is where the models differ.

Several of the articles which I will survey use the ISLM framework for the determination of interest rates. Although not all economists agree that the ISLM model is either accurate or appropriate, it is the one which is most commonly used by journalists, politicians, business people and economists who are policy-oriented (Evans 1987). Benjamin Friedman's 1978 article in the Brookings Papers on Economic activity entitled "Crowding Out or Crowding In? Economic Consequences of Financing Government Deficits", discusses why people think deficits are bad, the various definitions of crowding out, and the importance of debt management policy. Friedman says that people, especially politicians, are concerned about the deficit for two basic reasons. The first is that they perceive that it will cause inflation. The second is that it will depress investment

leading to slower economic growth. The inflationary fear comes from the belief that deficits will lead to excessive money creation. Even if the deficits are financed through interest bearing instruments, they can still cause inflation because these instruments contribute to an "effective money" which includes more than just cash and deposits. When money growth did not explode along with the deficits, the primary emphasis was placed on the interest bearing debt.

The fear of decreased investment due to deficits, known as crowding out, is the main focus of Friedman's paper. Friedman is careful to define exactly how he interprets "crowding out" since there are many definitions. If an economy is producing at full capacity and the government increases its use of some resources, it can only do so at the expense of private resources. This is also known as "real" crowding out or "ex-ante" crowding out. On the other side, if the economy is not producing at capacity, increased government spending can stimulate additional private investment due to accelerator effects, which is known as "crowding in".

The emphasis of of Friedman's paper, was not "real" crowding out, but what he refers to as "financial" crowding out. "Financial" crowding out is caused by issuing interest bearing debt. This type of crowding out is also the focus of this extended Master's paper and will be referred to simply as "crowding out" from here on. Friedman says that the crowding out occurs through both transactions demand,

and through wealth effects and portfolio adjustments which combine to raise interest rates and crowd out interest-sensitive private investment. Interest-sensitive private investment in plant and equipment or housing crowded out in this manner would slow future growth. This type of crowding out is particularly important because it can occur even when the economy is not at full capacity and would work against expansionary policy. Friedman mentions that the portfolio adjustment effect is especially dangerous because it has the potential to offset the standard income effect of fiscal policy.

Friedman's contention is that it is a misconception that debt financed through interest bearing instruments can only crowd out investment, and that it may in fact crowd in some investment depending upon the form of the debt. This is what makes debt management policy important, because it can minimize crowding out effects and maximize crowding in effects. Friedman argues that historically, short-term maturity debt has caused crowding in of investment whereas long-term maturity debt leads to crowding out. In the sixties, most debt was short-term and there was a great expansion in investment in new capital, but during the seventies most debt issued was long-term and there was much less capital formation.

Most of the work done after Friedman did not concentrate on debt management. The primary emphasis on the crowding out debate concentrated on determining if there was

empirical evidence to support the belief that increased deficits and higher interest rates are correlated, thereby causing crowding out. One such paper was that of Paul Evans (1985) entitled "Do Large Deficits Produce High Interest Rates?". Evans uses the ISLM framework because it is both popular and analytically tractable. Evans states that the ISLM model implies that there is a relationship between nominal interest rates and government spending, the real deficit, the real money stock, and the expected inflation rate. The expected inflation rate is difficult to measure so he relates it to other variables and eliminates it from the reduced form equation which he uses for the econometric analysis. Using ordinary least squares yields inconsistent estimators due to government spending, deficit and money stock being correlated with the error term. Evans uses two stage least squares to correct for the inconsistency.

The analysis covers a one hundred year period from the Civil War to the 1980's. For the Civil War period, Evans can find no correlation between the debt ratio, defined as the ratio of real deficit to trend real income, and interest rates. The same was true during World War One and World War Two. One explanation for the unexpected results was that people were forced to save because of price controls, rationing and, during WW II, pegged interest rates. Evans does not find empirical evidence to support this explanation, and suggests that Robert Barro's explanation of Ricardian equivalence, where people save money purposefully

in order to pay expected future tax burdens created to pay off the deficits, is more consistent with the numbers.

Finally, Evans looks at the post WWII period. He notes that others such as Feldstein and Eckstein (1970) have found some weak positive correlation between nominal interest rates and the deficit, whereas he and many others, such as Plosser (1982), can find none at all. One complication to finding evidence of correlation is that, for most of the postwar period, the Federal Reserve stabilized interest rates. Evans believed this may have contributed to hiding the true relationship between the deficits and interest rates. Another problem with finding evidence is that prior to 1980, the deficit was relatively small and did not vary greatly. When the deficit did vary, it was usually due to business cycle fluctuations.

After 1980, the deficits were much larger due to the defense buildup and major tax cuts. Interest rates were also much more free to seek their own levels. For these reasons, Evans says that if one were to find evidence of large deficits causing high interest rates it should happen in this period. Evans uses several different interest rates, most of which were short term, for his regression analyses. Again using two stage least squares, Evans did not find a significant positive relationship between the deficit and interest rates. The only significant coefficients on the deficit were in fact negative.

Evans states that the explanation which is most consistent with the data is again Robert Barro's Ricardian equivalence argument. Many economists find that Barro's explanation is implausible because it requires that households foresee future taxes implied by higher deficits and have "altruistic intergenerational transfer motives " (Evans 1985 p.85). Evans, however, feels that the theory should be judged on its predictive and explanatory value. Evans also states that the current paradigm of assuming a relationship between deficits and interest rates should be scrapped since it does not conform to the facts.

In his 1986 article, entitled "The Real Federal Deficit: What It Is, How It Matters, and What It Should Be", Robert Eisner completely disagrees with the Ricardian equivalence theory not only for the same reasons that others find it implausible, but also because the debt may not cause higher future taxes. Since most consumption theory is based on wealth, those who hold government bond assets hold additional wealth. As wealth goes up, consumption is increased and therefore investment is increased in order to cope with the increased consumption. Since deficits cannot cause crowding out, Eisner contends that it is tight money which raises interest rates and leads to crowding out.

For the deficit to have any of the previously mentioned effects, it must be a real deficit. Eisner states that the deficit in the national income and product accounts or the unified budget is far from being the economically relevant

real deficit. Eisner explains the reasons why these measures are incorrect. First of all the NIPA deficit includes expenditures for loans to the public which are in fact assets. Secondly, and more importantly, the real value of the net debt changes with interest and price levels. The inflation rate has greatly reduced the real market value of the national debt. There are other complications as well which Eisner mentions in passing but does not correct for, such as the debt being used to finance purchases of real assets from the private sector.

After correcting the deficit for the above problems, Eisner takes a look at the deficit for the years from 1955 to 1984. The results were fairly dramatic. For example, the official budget shows constant deficits since 1970, but because of the increased inflation and interest rates, Eisner's corrected data were quite a bit different. For example during the Carter administration from 1977 to 1980, the official budget shows deficits totalling over 152 billion dollars, but Eisner's data show a real budget surplus of 72 billion dollars. Eisner states that the 1981-1982 recession was perhaps due to the tight fiscal policy, and not just the much publicized tight monetary policy.

Analysis of the data also revealed that the real budget deficits were associated with increased consumption and increased investment. Therefore Eisner declares that past deficits have "crowded in investment, not crowded it out" (Eisner 1986 p. 15). Eisner also mentions some

international data to support his claims. For example, Japan has had the fastest growth rate in recent years, and it also had the highest inflation adjusted defict. At the opposite end of the spectrum, Eisner points out that the slow growing United Kingdom has been running an inflation adjusted surplus.

Since 1981, the change in the inflation adjusted deficit has been great. The drop in inflation along with the military spending and tax cuts has caused the real deficit to soar from a surplus of 1.45 percent of GNP in 1981 to a deficit of 2.01 percent of GNP in 1982. These deficits are enormous when compared with the previous high of 0.64% in 1955. Although Eisner does not feel that the current program of high real deficits is the proper one, he does feel that wiping out the deficit entirely is neither a good idea nor a sustainable one. Eisner suggests that the government put its priorities on infrastructure and human capital formation, because that is what is truly left for future generations.

One economist who did manage to find evidence of crowding out is Gregory Hoelscher, who in his 1986 paper "New Evidence on Deficits and Interest Rates", claims to have found strong evidence that larger deficits are associated with higher long-term interest rates. According to Hoelscher, long-term rates transfer the effects of the deficits to the real side of the economy. This is primarily due to the fact that interest sensitive private investment,

such as for homes or factories, are most sensitive to long-term rates.

Hoelscher was not able to find a correlation between deficits and short-term rates in an earlier paper using three month Treasury bill rates. However, in his 1986 study, which looked at yearly data on long-term interest rates and deficits from 1953 to 1984, he did find empirical evidence of crowding out effects. His study was done using a "loanable funds framework" which allows government borrowing to be a direct determinent of interest rates. The regression analysis was done using a semi-reduced form single equation model and finds strong correlation between deficits and ten year Treasury bond rates. This is found to be true over the entire period of the study as well as smaller subperiods, and not just the most recent period.

Hoelscher's analysis looks at three different measurements of the deficit including the NIPA numbers, the real deficit corrected for inflation, and the change in real Federal debt. For all three measures, there is a strong correlation between the deficit and long-term interest rates. The model Hoelscher uses is adapted from Sargent (1969) and Echols and Elliot (1976) and incorporates a loanable funds framework where it assumes equilibrium in saving and investment flows. The savings rate is dependent upon long-term rates, short-term rates, and expected inflation. The demand for loanable funds is dependent on the same things with the addition of GNP and the deficit.

Unlike Evans, Hoelscher does not try to eliminate expected inflation from the model, but instead he takes the data on 12 month expected inflation from the Livingston survey of inflation expectations.

Hoelscher also considers capital inflows into the supply of loanable funds. The foreign capital inflows were found to be insignificant in determining long-term rates. He suggests this is possibly because foreigners tend to prefer short-term instruments. His data also suggests that the deficit, although important, was not the only factor in recent years contributing to high long-term rates.

In his concluding remarks, Hoelscher postulates that the reason why there are not many other papers corroborating his results on long-term rates is that previous papers concentrated on quarterly or monthly data, rather than annual data which eliminated some of the periodicity problems caused by lags. The other reason is that other papers have a different, structural model using wealth effects as opposed to his model which emphasizes flows of funds and their direct effects on rates through changes in the demand for loanable funds.

Another paper looking at budget deficits and interest rates is Robert Barro's 1987 work entitled "Government Spending, Interest Rates, Prices, and Budget Deficits in the United Kingdom, 1701-1918". Barro's study used data only up through World War I in order to take advantage of the fact that there were frequent wars, with their associated

increase in spending and deficits, and there would be minimal distortions since there were few controls on interest rates and prices.

The study showed that there were mixed results on long-term rates. During some periods the rates seem to be moving in a random walk. In other periods, however, temporary increases in government spending, and the corresponding deficit, had positive effects on long-term interest rates. Even these results are somewhat inconclusive, because of the fact that Barro could not be sure if the rate movements were due to the increased spending accelerator effects or because of crowding out from the deficit, since they almost always occurred simultaneously. On two occasions, Barro did manage to find exogenous deficits not related to wartime spending, and there were no special interest rate movements.

In 1987, Paul Evans re-examined the issue of deficits and interest rates, using the same basic ISLM framework as his previous paper. The main differences with this paper, entitled "Do Budget Deficits Raise Nominal Interest Rates? Evidence from Six Countries", is that it makes a large effort to remove trends from the data, and it looks at international data to ensure that his conclusions in his previous work were not merely because of a statistical anomaly for the United States. The paper studies data from Canada, France, Germany, Japan and the United Kingdom.

Evans' paper once again finds no statistically significant, positive correlation between deficits and

nominal interest rates for any of the countries. The only significant correlations found were negative and countertheoretical. One change from the original paper is that he takes the time to explain why the ISLM model predicts a relationship between deficits and interest rates. His regression model is then directly developed from this theory and he uses Micro TSP to do vector autoregression analysis to determine the reduced form structure, which was not done in his previous paper.

Another unique aspect to this piece is that Evans experiments with the data by conglomerating all six countries' deficits and their capital markets which then share a single real interest rate. The results of the regressions run on the conglomerated data imply the same countertheoretical results as found in the individual countries. Evans once again points to Ricardian equivalence as a coherent theoretical explanation for the anomalies. This seems to be a curious explanation for conglomerated international data, considering the fact that the deficits were not spread evenly amongst countries and future tax burdens due to deficits in one country cannot fall on citizens of another country.

More recent work on the interest rate determination question was done by Robert Barro and Xavier Sala i Martin in their 1990 NBER working paper entitled, "World Real Interest Rates". They used the expected real interest rate for ten OECD countries as determined from the equations for

aggregate investment demand and aggregate desired saving. Shifts in investment demand due to changes in expected profitability are isolated by using stock-market returns. Changes in temporary income are captured by the price of oil which, along with monetary growth and fiscal policy, determine desired saving. They estimated the reduced form for GDP-weighted world averages of the expected short-term real interest rates and the investment ratio from 1959 up through 1988.

By using aggregated data from ten countries, Barro and Martin were able to look at one integrated capital market and use closed economy assumptions in their model. This seems reasonable since these ten countries represent 65% of the world real gross domestic product. Within this framework, higher real interest rates reflect positive shocks to investment demand or negative shocks to desired saving. The paper concentrates on short-term interest rates because of the difficulty in measuring long-term expected inflation. The short-term, expected rate of inflation which they used was based solely on the past history of inflation. Expected real interest rates were then calculated simply by subtracting expected inflation from nominal rates. Gross domestic capital formation weighted by GDP was used to approximate the investment ratio.

The two reduced form equations which Barro and Martin derived for expected short-term real interest rates and investment ratio have several implied relationships. The

first is that higher stock returns raise the expected short-term real interest rates as well as the investment ratio. The second is that higher oil prices should also raise expected real interest rates, but will lower the investment ratio. Thirdly, higher monetary growth should lead to lower real interest rates and increase the investment ratio. Finally, the model predicts crowding out where greater fiscal expansion should lead to higher expected real interest rates and to a lower investment ratio. There are additional implications of the model because of the persistence built into the investment demand and desired saving by including lagged values.

The results of the reduced form estimates of the expected short-term interest rates that Barro and Martin obtain are quite good, in that they are able to explain much of the variation in the interest rates from 1959 to 1988. World stock market returns, oil prices, and monetary expansion were found to reflect the implications of the model and be very significant determinents of the expected real interest rate. Fiscal variables, on the other hand, were not found to be extremely important. They ran regressions using world deficits and debt in several different forms and found insignificant coefficients for all of them. The signs of the coefficients were positive for the most part as expected, except for the world ratio of real budget deficits to real GDP, which had a countertheoretical, negative coefficient.

The results from regressions run on the reduced form for the world investment ratio had results similar to those for the expected real interest rates. The results were for the most part consistent with what the model had anticipated. Higher world stock market returns were found to significantly increase investment, and higher oil prices had the opposite effect. One difference between these results and those for expected real interest rates is that the interest rates were significantly effected by the previous years monetary growth, but the investment ratio regression finds monetary growth to have insignificant and sometimes countertheoretical coefficients. The results for fiscal data, using the same variables as before, found mostly insignificant coefficients. The coefficient for world debt ratio was negative as expected, but insignificant. The only coefficients which were significant were for world budget deficits ,but these were positive and therefore, countertheoretical.

One interesting aspect of Barro and Martin's paper was that their regression analysis found that the own-country variables for individual countries were not nearly as important as world variables, which would indicate that capital markets are indeed integrated. Two exceptions to this rule were Japan and the United Kingdom, which would indicate that their markets were somewhat isolated over at least part of the period studied.

Robert Barro's 1991 paper entitled "World Interest Rates and Investment" was a follow up work to the previously discussed paper he did with Martin. The framework of the analysis is virtually the same as before except that he has made slight modifications to the equations for investment demand and desired savings. The modification is that he creates a new variable to represent oil which is the ratio of expenditures on crude-oil consumption to GDP. This variable replaces the price of oil in the desired savings equation. This new variable is also added to the investment demand equation, which previously had no variable for oil in it.

The empirical results of this new work by Barro tend to confirm the conclusions made in the previous paper. The main difference is that Barro was able to find significant positive effects of world public debt on world expected real interest rates. The data suggests that the debt for an individual country is not an important determinant for the expected real interest rates faced by that country. So once again Barro concludes that capital markets are integrated, and it is world debt and world expected real interest rates which are related. Another thing to note is that although debt was found to be significant in this paper, it is still of secondary importance to stock market returns and oil consumption for the explanation of real interest rate movements. Barro concludes that the primary influence that government policy has had on interest rates has not come

through traditional fiscal and monetary policy. The main impact on real interest rates has come from political events such as the Persian Gulf war and the oil crises. Therefore, political stability, and not traditional macro policy, has been the major factor impacting financial markets thereby affecting real interest rates and investment.

There have been two major types of frameworks which have been used to find determinants of interest rates and crowding out effects. One is the ISLM framework used by several authors from Benjamin Friedman to Paul Evans. The other major framework is that used by Hoelscher and Barro, which equates investment demand and desired savings in order to determine interest rates.

In either framework, reduced form equations are found and used to run regression analyses. The results of virtually all the ISLM framework models found no significant evidence of the expected relationship between fiscal variables and interest rates, and in some cases found significant evidence to the contrary. This led some authors to conclude that the idea of Ricardian equivalence should be resurrected. The results of the models equating investment demand to desired saving were able to find at least some positive effect of expansionary fiscal policy on interest rates.

The reasons for the contradictory results between the two frameworks are due to more than just their differing structures. One reason is that most of the ISLM papers were

written before the papers using the investment/savings framework. An exception to this rule is Hoelscher's 1986 paper which did use the investment/savings framework and was written before the second paper by Evans. This paper was also an exception in that it concentrated on long-term interest rates. Other authors have avoided using long-term rates due to the difficulty in determining long term expected inflation, and because long-term rates tend to stay up for fear of a monetization of the debt. This would be an entirely different form of crowding out than what Friedman called "financial" crowding out. Although this "fear of monetization" crowding out would be a worthy topic, it is not the focus of this paper.

Another reason for the differences in results is that Evans' 1987 paper was the only ISLM framework paper to consider aggregating data from several countries, but this is the central focus of the most recent works by Barro. Considering how much more global markets have become in the last forty years, the importance of aggregating world data before analysis would be difficult to overemphasize. The focus on deficits instead of accumulated debt in the ISLM models may also have contributed to their failure to find significant fiscal coefficients. Barro's recent paper only found significant coefficients for debt and not deficits. This makes sense because most economists would agree that it is the trend of continually running deficits, creating a

debt, which is truly more important than running a deficit in any particular year.

III. EMPIRICAL ANALYSES

The present study attempts to incorporate the most important aspects of the previous works discussed. These important aspects include: the use of real versus nominal variables, looking at both deficits and debt, trying different stuctures for interest rate determination, including variables such as oil prices and stock returns which have been found to have high explanatory value, and using data from more than one country to be analyzed in an integrated form.

For my study, I wanted to obtain data for the G-7 countries since the 1960's. Unfortunately, due to difficulty in finding consistent, readily available data series for the desired countries and years, I was forced to greatly cut down the number of countries and the time span used. My data set includes data from only three countries: the United States, France, and Germany. The data is quarterly from the first quarter of 1970 to the second quarter of 1990. A representative portion of this data is reported in Appendix II.

Using this data set, I attempted to duplicate the results of two different papers which I have already discussed. The first of these was the one done by Evans in his 1985 paper "Do Large Deficits Produce High Interest Rates?", which uses the ISLM framework (see Appendix I for

reduced form equation). Evans' paper uses United States data from a very large time period, so I have only looked at the period which corresponds with my data. On page 84, table 6, column (6.6) of Evans's paper, he reports regression analysis for U.S. montly data from October 1979 to December 1983.

Evans uses the real one month T-bill rate for the dependent variable and regresses on a constant, a trend variable, the government spending ratio, the deficit ratio, and the money ratio. Evans found that only the constant and the money ratio were significant and consistent with the ISLM pardigm. The other coefficients were all insignificant. The negative coefficients for the deficit ratio and the government spending ratio were also countertheoretical. It should be noted, however, that for other regressions, Evans did find positive coefficients for government spending ratio.

The results of my regressions were quite different (see complete regression results in Appendix I). The first and second regressions use U.S. data from my entire data set, and do ordinary least squares using short term real interest rates as the dependent variable and the same independent variables Evans uses except that the second regression includes a lagged dependent variable to clear up the autocorrelation noticed in the Durbin-Watson statistic. The coefficients are all significant. The coefficients for the government spending ratio and deficit ratio were both

positive, and the coefficient for the money ratio was negative which is all consistent with the ISLM paradigm.

The third and fourth regressions were done using the same basic structure as the first two, except that this time I used the integrated, GDP-weighted, world data. The results of these two regressions are quite similar to the previous two, which would suggest that the world capital market works in a similar manner to the U.S. market. Looking at regression number four, which includes the lagged real interest rate, we see that after correcting for serial correlation, all the coefficients are still consistent with ISLM, although the world government spending ratio is no longer significant.

The second paper whose work I tried to duplicate was the 1990 paper by Barro and Martin called "World Real Interest Rates". The frame work and implications of their model have already been discussed (see pages 14-17). Using the same reduced form equations as Barro and Martin use, I ran three regressions to see if I could reproduce the results on world interest rates found in Table 2 of their article (see Appendix I for reduced form equation). The first of these regressions used my entire data set, and the second two regressions split the twenty year period into two subperiods.

Barro and Martin found coefficients that were consistent with their paradigm including: positive coefficients for stock returns, the price of oil, the

investment ratio, and the debt ratio and negative coefficients for the constant, the growth rate of money and the deficit ratio. My results were remarkably similar to Barro and Martin's. All of my coefficients matching theirs except for negative coefficient on the investment ratio in the third regression which was insignificant anyway. The main difference between my results and theirs is that,in general, I found debt and deficit ratios to be significant and the money growth rate to be insignificant.

The next group of regressions were run using the three countries' own real interest rates as the dependent variables, and for the independent variables I switched between the own country variables and the world variables. This was done to determine whether or not the world capital market is truly integrated. If the real interest rates in a country were better predicted by the world data than their own country data, then this would suggest that there really is one world capital market.

The regressions run using the German real interest rates as the dependent variables support the hypothesis that we should look at integrated capital markets, because the world data does a much better job at explaining interest rate movements. The world data regression has a much higher R-squared value, and the coefficients were more consistent with the paradigm. However, since this is insufficient to make a definite assertion, I performed an F-test using the equation in regression number eight for the restricted

equation, and the equation in regression ten for the unrestricted equation. The F-statistic, derived from the sum of squared residuals and the degrees of freedom, was 5.097 which is greater than the 3.17 needed to be significant at the one percent level. Therefore, the world data are definitely superior in explanatory power for describing German interest rate movement. The regressions using the French and U.S. versus world data are less dramatic. There are virtually no difference between the R-squared and coefficients between the own country data and the world data.

I next tried to duplicate what Barro and Martin had done on their Table 3 which show the regression results using the same independent variables as before, but this time using world investment ratio as the dependent variable instead of world real interest rates. The first regression I ran was using the exact same reduced form as they used. Unfortunately, there was a problem in that the lagged dependent variable had a coefficient close to one and was responsible for the huge R-squared value. Because of this problem, I calculated the change in the investment ratio and used that for the dependent variable in the next three regressions. The full twenty year period was used for the first regression, and then the second two regressions were done using ten year subperiods. For the first regression, the results were unimpressive, with a low R-squared and a significant coefficient only on world stock returns. The

second regression, which covered the seventies, had a better R-squared, but the most significant coefficients were for stock returns again, and a countertheoretical positive coefficient for the debt ratio. For the last regression, covering the eighties, the results were quite weak due to the fact that none of the coefficients were significant.

IV. Conclusion

After analyzing my attempts to simulate the study by Evans, as well as that of Barro and Martin, I have been able to draw a few conclusions. The first conclusion is that some of the world data may have been skewed, because of the large U.S. influence. The U.S. represents approximately three quarters of the "three country" world GDP. Ideally, I would have been able to use several more countries, especially Japan.

Japan would have been an important contribution because its huge GDP would have counterbalanced the U.S. influence, and over forty percent of real world GDP would have been included in the data set. Unfortunately, I could not use Japan because they stopped reporting deficit information to my data sources since sometime in the mid-sixties. Barro reported finding this data in Monthly Statistics of Japan, but this periodical is not available at Strozier Library.

Another conclusion is that any further research should definitely include stock returns and oil prices, since these were significant in nearly every regression. Barro and Martin were clever to include these in order make

adjustments for changes in income and investment profitability. These are important to include because they tend to shift the entire curve for both investment and desired savings.

Additional data which may have proved fruitful would have been to use more than one interest rate. In my original paper, I used three different types of interest rate and had distinct results for each of them. It would also have been interesting to expand the subject as Hoelscher (1986) did by including the effects of crowding out on long-term interest rates.

Finally, I conclude that my analysis provides some evidence that crowing out exists, and that the best way to look for it is probably by using a model which has an integrated world capital market. It is somewhat troubling that I was able to find such high significance levels for fiscal variables, where other studies have found virtually none. One explanation for this could be that the other studies had removed trends from the data, whereas I did not. Clearly, if I were to continue research on the subject of crowding out, I would be obliged to investigate this further. Even had I not been able to find clear evidence of crowding out, I would not be ready to embrace the theory of Ricardian equivalence or something of that nature. It is my opinion that we will have to wait for many more years of additional data and study, before we can even hope to come to any serious conclusions.

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APPENDIX I: REGRESSION OUTPUT

VARIABLES USED

Real Interest Rates- Nominal rates corrected for inflation.

USRINT- United States real interest rate.
FRRINT- French real interest rate.
GERINT- German real interest rate.
WRINT- world real interest rate.

Real Stock Returns- Nominal stock returns corrected for inflation.

USTOKRR- United States real stock return.
FSTOKRR- French real stock return.
GSTOKRR- German real stock return.
WSTOCKR- world real stock return.

Ratios- Deflated levels divided by the real GDP.

USDFRAT, FRDFRAT, GEDFRAT, WDFRAT- deficit ratios.
USDETRAT, FRDETRAT, GEDETRAT, WDEBTRAT- debt ratios.
USGOVRAT, FRGOVRAT, GEGOVRAT, WDGOVRAT- government spending ratios.
USINVRAT, FRINVRAT, GERINVRAT, WINVRAT- investment ratios.
WCINVRAT- the change in WINVRAT.
USMIRAT- MI ratio for the United States.

MI- The growth rate of MI.

USMI, FRMI, GEMI, WMI.

Others

POIL- relative price of crude oil determined by ratio of producer price index for crude oil to total producer price index in the U.S.
WINV- deflated world investment level.
WRDEF-deflated world deficit level.
WRDEBT-deflated world debt.

REDUCED FORM EQUATIONS

EVANS

$$R = a + bGOVRAT + cDFRAT + d(M/P) + U$$

This is interpreted as the interest rate is determined by a constant, the government spending ratio, the deficit ratio, the real money supply, and unsystematic variation.

BARRO AND MARTIN

$$Rt = 1/(a2 + b2)*(a0-b0 + a1*STOCKt-1 + b1*POILt-1 + a2*Rt-1 + (1-b3)*(I/Y)t-1 - b4*Mt-1 + b5*FISCALt-1 + e.$$

This is interpreted as the present interest rate is determined by stock market returns, the price of oil, the investment ratio, the growth rate in MI, the interest rate itself, and fiscal variables which are all lagged one period.

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LS // Dependent Variable is USRINT
Date: 6-16-1993 / Time: 0:02
SMPL range: 1970.1 - 1990.2
Number of observations: 82

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-38.411151	6.8818577	-5.5815091	0.0000
TREND	0.6308261	0.1071712	5.8861539	0.0000
USGOVRAT	59.905523	11.457119	5.2286725	0.0000
USDFRAT	125.94177	45.506551	2.7675525	0.0071
USMIRAT	-1.8457247	0.3472624	-5.3150726	0.0000

1

R-squared	0.542095	Mean of dependent var	1.485843
Adjusted R-squared	0.518308	S.D. of dependent var	3.547769
S.E. of regression	2.462295	Sum of squared resid	466.8431
Log likelihood	-187.6632	F-statistic	22.78931
Durbin-Watson stat	1.420857	Prob(F-statistic)	0.000000

LS // Dependent Variable is USRINT
Date: 6-16-1993 / Time: 0:13
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-29.438466	8.4675749	-3.4766113	0.0008
TREND	0.4844739	0.1333784	3.6323268	0.0005
USGOVRAT	45.679001	13.940443	3.2767251	0.0016
USDFRAT	109.57811	45.990095	2.3826459	0.0197
USMIRAT	-1.4215408	0.4150126	-3.4252954	0.0010
USRINT(-1)	0.2061770	0.1110904	1.8559392	0.0674

2

R-squared	0.562275	Mean of dependent var	1.485104
Adjusted R-squared	0.533093	S.D. of dependent var	3.569868
S.E. of regression	2.439311	Sum of squared resid	446.2678
Log likelihood	-184.0461	F-statistic	19.26810
Durbin-Watson stat	1.839306	Prob(F-statistic)	0.000000

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LS // Dependent Variable is WRINT
Date: 6-16-1993 / Time: 1:21
SMPL range: 1970.1 - 1990.2
Number of observations: 82

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-6.7113741	2.6479419	-2.5345624	0.0133
TREND	0.1126705	0.0280247	4.0203934	0.0001
WDGOVRAT	15.979493	6.9064096	2.3137192	0.0234
WDFRAT	291.59122	71.976087	4.0512235	0.0001
WMI	-0.0640869	0.1045999	-0.6126856	0.5419

3

R-squared	0.451443	Mean of dependent var	1.067652
Adjusted R-squared	0.422946	S.D. of dependent var	3.138322
S.E. of regression	2.383996	Sum of squared resid	437.6248
Log likelihood	-185.0133	F-statistic	15.84206
Durbin-Watson stat	1.187124	Prob(F-statistic)	0.000000

LS // Dependent Variable is WRINT
Date: 6-16-1993 / Time: 1:24
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-3.2346583	2.6760904	-1.2087253	0.2306
TREND	0.0628959	0.0298208	2.1091266	0.0383
WDGOVRAT	7.5860573	7.0314406	1.0788767	0.2841
WDFRAT	181.75748	74.180170	2.4502166	0.0166
WMI	-0.0683715	0.0991290	-0.6897218	0.4925
WRINT(-1)	0.3818124	0.1080792	3.5327074	0.0007

4

R-squared	0.530946	Mean of dependent var	1.666871
Adjusted R-squared	0.499676	S.D. of dependent var	3.157868
S.E. of regression	2.233673	Sum of squared resid	374.1973
Log likelihood	-176.9125	F-statistic	16.97927
Durbin-Watson stat	1.988338	Prob(F-statistic)	0.000000

LS // Dependent Variable is WRINT
Date: 6-16-1993 / Time: 2:45
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-11.709356	2.8854303	-4.0560971	0.0001
WSTOCKR(-1)	0.0405567	0.0350872	1.1558850	0.2515
PCIL(-1)	7.4816521	1.4374283	5.2046872	0.0000
WINVRAT(-1)	17.093017	6.5399613	2.6136267	0.0109
WMI(-1)	-0.1240158	0.0844189	-1.4690528	0.1461
WDEBTRAT(-1)	30.238980	6.1233828	4.9382801	0.0000
WDFRAT(-1)	-209.15614	64.989989	-3.2182825	0.0019
WRINT(-1)	0.2356217	0.1091183	2.1593244	0.0341

R-squared	0.672698	Mean of dependent var	1.666871
Adjusted R-squared	0.641532	S.D. of dependent var	3.157868
S.E. of regression	1.890686	Sum of squared resid	260.9525
Log likelihood	-162.3145	F-statistic	21.45311
Durbin-Watson stat	2.200795	Prob(F-statistic)	0.000000

LS // Dependent Variable is WRINT
Date: 6-16-1993 / Time: 2:50
SMPL range: 1970.2 - 1980.1
Number of observations: 40

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-12.703763	9.0232887	-1.4078861	0.1688
WSTOCKR(-1)	0.0824813	0.0456529	1.8067035	0.0802
POIL(-1)	4.1191801	8.9933644	0.4580244	0.6500
WINVRAT(-1)	20.431520	17.261053	1.1823076	0.2458
WMI(-1)	-0.1190288	0.1681975	-0.7076726	0.4843
WDEBTRAT(-1)	41.173761	26.750520	1.5391761	0.1336
WDFRAT(-1)	-267.84103	83.303062	-3.2152604	0.0030
WRINT(-1)	0.2234617	0.1682099	1.3284695	0.1934

R-squared	0.396362	Mean of dependent var	-0.706681
Adjusted R-squared	0.264340	S.D. of dependent var	1.932736
S.E. of regression	1.657719	Sum of squared resid	87.93704
Log likelihood	-72.51237	F-statistic	3.001950
Durbin-Watson stat	2.091621	Prob(F-statistic)	0.015355

6

LS // Dependent Variable is WRINT
Date: 6-16-1993 / Time: 2:54
SMPL range: 1980.1 - 1990.2
Number of observations: 42

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-5.1660618	4.3684947	-1.1825725	0.2452
WSTOCKR(-1)	0.0026016	0.0541568	0.0480383	0.9620
POIL(-1)	10.519650	2.4421625	4.3075142	0.0001
WINVRAT(-1)	-61.371503	35.754395	-1.7164744	0.0952
WMI(-1)	-0.0357746	0.1145701	-0.3122508	0.7568
WDEBTRAT(-1)	26.424838	8.6281877	3.0626174	0.0043
WDFRAT(-1)	-82.215246	108.59596	-0.7570746	0.4542
WRINT(-1)	0.0162330	0.1628202	0.0996987	0.9212

7

R-squared	0.452664	Mean of dependent var	3.794126
Adjusted R-squared	0.339977	S.D. of dependent var	2.556715
S.E. of regression	2.077121	Sum of squared resid	146.6907
Log likelihood	-85.85921	F-statistic	4.017010
Durbin-Watson stat	2.026714	Prob(F-statistic)	0.002652

LS // Dependent Variable is GERINT
Date: 6-16-1993 / Time: 4:29
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	7.7704460	5.5173508	1.4083654	0.1633
GSTOKRR(-1)	-0.0273056	0.0440140	-0.6203850	0.5369
POIL(-1)	0.6924288	2.1351533	0.3242994	0.7466
GEINVRAT(-1)	-10.973454	11.844336	-0.9264728	0.3573
GEMI(-1)	-0.2428205	0.0946422	-2.5656671	0.0124
GEDETRAT(-1)	-2.2640625	25.924431	-0.0873332	0.9306
GEDFRAT(-1)	-388.60084	102.91557	-3.7759188	0.0003
GERINT(-1)	-0.0222330	0.1117271	-0.1989941	0.8428

R-squared	0.394132	Mean of dependent var	2.406246
Adjusted R-squared	0.336035	S.D. of dependent var	3.192255
S.E. of regression	2.601178	Sum of squared resid	493.9274
Log likelihood	-188.1556	F-statistic	6.784047
Durbin-Watson stat	2.067116	Prob(F-statistic)	0.000003

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LS // Dependent Variable is GERINT
Date: 6-16-1993 / Time: 4:25
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-7.2342900	3.1455849	-2.2998235	0.0243
WSTOCKR(-1)	-0.0208783	0.0456500	-0.4573565	0.6488
POIL(-1)	5.5618176	1.5921637	3.4932447	0.0008
WINVRAT(-1)	10.681992	7.7019530	1.3869199	0.1697
WMI(-1)	-0.0797027	0.1049534	-0.7594103	0.4501
WDEBTRAT(-1)	29.134669	6.5503305	4.4478166	0.0000
WDFRAT(-1)	-514.92480	79.917792	-6.4431811	0.0000
GERINT(-1)	0.0605332	0.0954427	0.6342360	0.5279

R-squared	0.489585	Mean of dependent var	2.406246
Adjusted R-squared	0.440641	S.D. of dependent var	3.192255
S.E. of regression	2.387498	Sum of squared resid	416.1108
Log likelihood	-181.2124	F-statistic	10.00297
Durbin-Watson stat	1.813306	Prob(F-statistic)	0.000000

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LS // Dependent Variable is GEBINT
Date: 6-20-1993 / Time: 14:05
SMPL range: 1976.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	3.5472785	6.8192670	0.5201847	0.6046
GSTOCKRT(-1)	-0.0241151	0.0533049	-0.4523992	0.6524
PC1L(-1)	2.2641808	3.2695954	0.6924957	0.4910
GEINVRAT(-1)	-14.343083	20.813680	-0.6891191	0.4931
GEMI(-1)	-0.2079920	0.0971899	-2.1400583	0.0359
GEDEFRAT(-1)	-10.354250	42.494069	-0.2436634	0.8082
GEDEFRT(-1)	-184.35630	110.85056	-1.6631066	0.1009
GEBINT(-1)	-0.0347031	0.1021722	-0.3399467	0.7349
MSTOCKR(-1)	0.0157696	0.0682621	0.2363383	0.8139
MINVRAT(-1)	10.024051	30.298357	0.3308447	0.7419
MMI(-1)	0.0248187	0.1206918	0.2056360	0.8377
MDEFRAT(-1)	15.021218	23.819136	0.6306365	0.5304
MDEFRT(-1)	-424.06775	91.032094	-4.6586619	0.0000

R-squared	0.550916	Mean of dependent var	2.406296
Adjusted R-squared	0.471606	S.E. of dependent var	3.192255
S.E. of regression	2.320340	Sum of squared resid	361.1100
Log likelihood	-176.0277	F-statistic	6.951624
Durbin-Watson stat	1.942012	Prob(F-statistic)	0.000000

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LS // Dependent Variable is FRRINT
Date: 6-16-1993 / Time: 4:09
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-14.745011	3.5141564	-4.1958892	0.0001
FSTOKRR(-1)	-0.0186660	0.0265681	-0.7025745	0.4845
POIL(-1)	9.5984637	2.2202710	4.3231045	0.0000
FRINVRAT(-1)	15.143949	4.4316041	3.4172612	0.0010
FRMI(-1)	-0.0714350	0.0639737	-1.1166319	0.2678
FRDETRAT(-1)	240.60957	44.184858	5.4455208	0.0000
FRRINT(-1)	0.1109257	0.1072769	1.0340131	0.3045

R-squared	0.653685	Mean of dependent var	1.924393
Adjusted R-squared	0.625605	S.D. of dependent var	3.584134
S.E. of regression	2.193054	Sum of squared resid	355.9018
Log likelihood	-174.8824	F-statistic	23.27968
Durbin-Watson stat	2.051693	Prob(F-statistic)	0.000000

LS // Dependent Variable is FRRINT
Date: 6-16-1993 / Time: 3:55
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-13.201544	3.2241733	-4.0945517	0.0001
WSTOCKR(-1)	-0.0440723	0.0423752	-1.0400481	0.3018
POIL(-1)	3.5824105	1.4505127	2.4697547	0.0159
WINVRAT(-1)	18.085784	7.4104503	2.4405783	0.0171
WMI(-1)	-0.1642734	0.1002471	-1.6386848	0.1056
WDEBTRAT(-1)	46.986212	7.9696400	5.8956505	0.0000
WDFRAT(-1)	-101.99226	75.561391	-1.3497932	0.1813
FRRINT(-1)	0.0833026	0.1203753	0.6920236	0.4911

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R-squared	0.655332	Mean of dependent var	1.924393
Adjusted R-squared	0.622282	S.D. of dependent var	3.584134
S.E. of regression	2.202765	Sum of squared resid	354.2087
Log likelihood	-174.6892	F-statistic	19.82830
Durbin-Watson stat	2.187777	Prob(F-statistic)	0.000000

LS // Dependent Variable is USRINT
Date: 6-16-1993 / Time: 3:30
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-27.408418	4.2849495	-6.3964390	0.0000
USTOKRR(-1)	0.0562257	0.0398340	1.4115009	0.1623
POIL(-1)	15.327731	1.9745958	7.7624650	0.0000
USINVRAT(-1)	10.699762	2.2251822	4.8084857	0.0000
USMI(-1)	-0.0840547	0.0880461	-0.9546665	0.3429
USDETRAT(-1)	36.798362	5.7283640	6.4238869	0.0000
USDFRAT(-1)	-58.113005	44.241411	-1.3135432	0.1931

13

R-squared	0.595149	Mean of dependent var	1.485104
Adjusted R-squared	0.562323	S.D. of dependent var	3.569868
S.E. of regression	2.361723	Sum of squared resid	412.7525
Log likelihood	-180.8842	F-statistic	18.13053
Durbin-Watson stat	1.876172	Prob(F-statistic)	0.000000

LS // Dependent Variable is USRINT
Date: 6-16-1993 / Time: 3:07
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-13.298473	3.5486481	-3.7474757	0.0004
WSTOCKR(-1)	0.0593115	0.0433458	1.3683336	0.1754
POIL(-1)	8.7168192	1.7796035	4.8981805	0.0000
WINVRAT(-1)	19.899362	8.0758718	2.4640512	0.0161
WMI(-1)	-0.1461384	0.1032919	-1.4148096	0.1614
WDEBTRAT(-1)	31.205450	7.2729800	4.2906003	0.0001
WDFRAT(-1)	-163.54985	80.786492	-2.0244702	0.0466
USRINT(-1)	0.2074503	0.1158099	1.7908514	0.0775

14

R-squared	0.613321	Mean of dependent var	1.485104
Adjusted R-squared	0.576242	S.D. of dependent var	3.569868
S.E. of regression	2.323866	Sum of squared resid	394.2257
Log likelihood	-179.0242	F-statistic	16.54100
Durbin-Watson stat	2.121532	Prob(F-statistic)	0.000000

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LS // Dependent Variable is WINVRAT
Date: 6-16-1993 / Time: 5:39
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-0.0043877	0.0069155	-0.6344807	0.5278
WSTOCKP(-1)	0.0002126	8.409E-05	2.5286309	0.0136
PCIL(-1)	0.0019973	0.0034451	0.5797496	0.5639
WINVRAT(-1)	0.9993951	0.0156743	63.760163	0.0000
WMI(-1)	-5.879E-05	0.0002023	-0.2905455	0.7722
WDEBTRAT(-1)	0.0009692	0.0146759	0.0660404	0.9475
WDFRAT(-1)	0.0464971	0.1557611	0.2985154	0.7662
WRINT(-1)	0.0003380	0.0002615	1.2923366	0.2003

15

R-squared	0.995427	Mean of dependent var	0.151681
Adjusted R-squared	0.994988	S.D. of dependent var	0.064010
S.E. of regression	0.004531	Sum of squared resid	0.001499
Log likelihood	326.4123	F-statistic	2270.027
Durbin-Watson stat	1.147771	Prob(F-statistic)	0.000000

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LS // Dependent Variable is WCINVRAT
Date: 6-16-1993 / Time: 2:21
SMPL range: 1970.2 - 1990.2
Number of observations: 81

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-0.0046298	0.0028933	-1.6001975	0.1138
WSTOCKR(-1)	0.0002127	8.351E-05	2.5470787	0.0129
PCIL(-1)	0.0020819	0.0026401	0.7885410	0.4329
WRINT(-1)	0.0003343	0.0002419	1.3819706	0.1711
WMI(-1)	-5.971E-05	0.0001995	-0.2992727	0.7656
WDEBTRAT(-1)	0.0014091	0.0091837	0.1534303	0.8785
WDFRAT(-1)	0.0464744	0.1547056	0.3004057	0.7647

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R-squared	0.211963	Mean of dependent var	-0.002592
Adjusted R-squared	0.148068	S.D. of dependent var	0.004876
S.E. of regression	0.004501	Sum of squared resid	0.001499
Log likelihood	326.4115	F-statistic	3.317371
Durbin-Watson stat	1.148365	Prob(F-statistic)	0.006010

LS // Dependent Variable is WCINVRAT
Date: 6-16-1993 / Time: 2:30
SMPL range: 1970.2 - 1980.1
Number of observations: 40

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-0.0390872	0.0108507	-3.6022873	0.0010
WSTOCKR(-1)	0.0003420	0.0001268	2.6973268	0.0109
POIL(-1)	-0.0131933	0.0102753	-1.2839807	0.2081
WRINT(-1)	0.0005850	0.0004686	1.2483450	0.2207
WM1(-1)	-0.0005142	0.0004697	-1.0948850	0.2815
WDEBTRAT(-1)	0.2548176	0.0750470	3.3954411	0.0018
WDFRAT(-1)	-0.0973695	0.2339200	-0.4162515	0.6799

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R-squared	0.464413	Mean of dependent var	-0.003972
Adjusted R-squared	0.367033	S.D. of dependent var	0.005855
S.E. of regression	0.004658	Sum of squared resid	0.000716
Log likelihood	161.8574	F-statistic	4.769101
Durbin-Watson stat	1.771474	Prob(F-statistic)	0.001335

LS // Dependent Variable is WCINVRAT
Date: 6-16-1993 / Time: 2:35
SMPL range: 1980.1 - 1990.2
Number of observations: 42

VARIABLE	COEFFICIENT	STD. ERROR	T-STAT.	2-TAIL SIG.
C	-0.0095739	0.0056289	-1.7008289	0.0978
WSTOCKR(-1)	4.041E-05	8.785E-05	0.4600070	0.6484
POIL(-1)	0.0044796	0.0032756	1.3675715	0.1802
WRINT(-1)	0.0001678	0.0002598	0.6460175	0.5225
WMI(-1)	-2.457E-05	0.0001736	-0.1415428	0.8883
WDEBTRAT(-1)	0.0153101	0.0139219	1.0997082	0.2790
WDFRAT(-1)	-0.0633553	0.1744197	-0.3632350	0.7186

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R-squared	0.120004	Mean of dependent var	-0.001393
Adjusted R-squared	-0.030852	S.D. of dependent var	0.003320
S.E. of regression	0.003371	Sum of squared resid	0.000398
Log likelihood	183.3186	F-statistic	0.795485
Durbin-Watson stat	1.111547	Prob(F-statistic)	0.579843

APPENDIX II: DATA

16d2e7.6c66Fs10H

obs	WRINT			
1970	1.730919	1.113504	3.661135	-0.459883
1971	1.141175	-1.002190	2.807833	0.952215
1972	-0.318579	0.228824	0.229081	0.407053
1973	-1.752241	-0.795031	1.060786	-0.820992
1974	-4.843444	-2.093777	-2.087089	-1.723879
1975	-0.919667	-1.553921	-1.331216	-0.524714
1976	0.350908	-0.817104	0.123546	0.493610
1977	-3.210196	-2.743318	0.959717	1.904736
1978	-1.475720	-4.038318	0.085641	0.982625
1979	-3.399791	-4.015875	-2.313047	1.420799
1980	-3.930483	-0.966710	3.271863	2.618219
1981	2.846527	5.366294	3.758031	7.657290
1982	9.429468	1.739054	6.644697	7.922934
1983	6.022229	1.769208	3.987166	5.910042
1984	3.853109	5.316839	5.431234	7.025533
1985	3.623162	3.318470	4.711513	3.679677
1986	8.318463	3.552660	3.884724	4.547503
1987	0.315946	1.299521	1.814165	4.294528
1988	2.076912	1.251503	1.675720	5.035103
1989	2.233254	2.623697	5.495799	4.499352
1990	1.001461	4.427625		

16d2e7.6c66Fs10H

obs	WINV			
1970	1011.500	966.2407	983.1322	974.1464
1971	995.8198	1020.574	1029.248	1040.882
1972	1066.893	1074.238	1074.499	1112.698
1973	1131.333	1104.687	1064.545	1034.359
1974	980.7474	933.5640	882.5676	808.9792
1975	740.0089	718.5134	726.7650	732.0723
1976	754.3449	752.7883	748.3081	774.7660
1977	787.5130	811.5288	810.2291	809.3977
1978	797.7894	821.9245	821.4290	816.6637
1979	795.3417	765.9531	749.1472	719.9267
1980	682.3406	600.2260	590.2876	599.1097
1981	595.6893	587.1282	572.3180	548.4384
1982	533.4761	506.8383	491.8612	497.5393
1983	498.0270	516.1279	541.2635	566.0847
1984	576.6877	597.0612	603.6665	611.9434
1985	618.8408	613.7372	600.2266	598.3648
1986	592.2818	585.2286	574.4557	572.1500
1987	545.5574	546.2078	552.9781	548.1213
1988	544.9477	550.5842	550.7769	548.9230
1989	542.6697	533.7056	529.1276	517.1812
1990	512.0025	496.2498		

16d2c7.6c66Fs10H

obs				
		WRDEF		
1970	7.469573	-19.44958	17.33027	19.13273
1971	17.72905	-3.875643	16.47857	21.88207
1972	21.16055	-11.26663	3.756520	21.01157
1973	18.19127	-14.20811	2.150002	8.526282
1974	11.93763	-16.20271	2.950548	19.52878
1975	27.72657	19.15369	29.78089	39.54110
1976	34.40577	-2.425832	19.82400	31.69516
1977	25.87751	-10.63799	17.69275	36.70150
1978	33.46387	-15.75452	11.44308	27.01069
1979	23.95582	-21.57295	5.950932	23.53680
1980	27.07335	-6.570940	16.31494	29.34422
1981	30.50833	-13.31712	8.619547	44.09269
1982	24.46860	7.442960	36.93742	59.35426
1983	55.17456	28.58798	36.81832	53.01891
1984	48.90207	24.11218	32.34212	59.94914
1985	50.54010	26.39355	40.76916	58.84851
1986	49.25083	23.01020	41.50494	46.96212
1987	43.64798	-1.559613	21.40569	56.06447
1988	27.94778	0.840192	25.21409	44.68900
1989	41.91040	-15.06177	31.29008	43.73694
1990	51.41226	6.683942		

16d2c7.6c66Fs10H

obs				
		WRDEBT		
1970	639.5226	614.9048	632.5754	648.7805
1971	670.1603	663.4696	676.7298	695.4942
1972	709.3177	698.3557	701.7801	723.6243
1973	733.6072	705.2336	689.4725	708.1990
1974	731.9690	707.8056	711.1951	726.4856
1975	737.6146	755.8234	800.8758	843.4233
1976	878.0557	878.4839	901.7505	928.1605
1977	954.7045	945.3762	961.9017	988.2066
1978	1010.621	998.0518	999.5522	1013.651
1979	1035.497	1015.124	1010.605	1026.645
1980	1053.606	1046.864	1058.662	1113.666
1981	1170.976	1182.160	1208.477	1233.408
1982	1267.443	1283.342	1338.236	1400.213
1983	1445.322	1494.273	1554.331	1612.833
1984	1667.372	1699.269	1749.515	1822.237
1985	1894.554	1903.501	1919.885	1947.474
1986	1969.506	1974.211	1989.091	2019.524
1987	2036.223	2024.644	2055.717	2079.527
1988	2100.472	2110.606	2176.914	2196.701
1989	2254.971	2201.011	2288.242	2306.295
1990	2306.617	2306.382		

obs	WDFRAT			
1970	0.002090	-0.005419	0.004769	0.005278
1971	0.004800	-0.001042	0.004381	0.005762
1972	0.005417	-0.002837	0.000935	0.005155
1973	0.004304	-0.003277	0.000483	0.001930
1974	0.002776	-0.003715	0.000683	0.004509
1975	0.006390	0.004359	0.006797	0.008945
1976	0.007636	-0.000538	0.004402	0.006919
1977	0.005571	-0.002256	0.003695	0.007586
1978	0.006783	-0.003106	0.002214	0.005088
1979	0.004501	-0.004054	0.001099	0.004300
1980	0.004925	-0.001226	0.003030	0.005491
1981	0.005786	-0.002597	0.001740	0.008675
1982	0.004917	0.001501	0.007601	0.012224
1983	0.011197	0.005738	0.007410	0.010532
1984	0.009568	0.004680	0.006319	0.011731
1985	0.009958	0.005106	0.007676	0.010815
1986	0.008793	0.004067	0.007183	0.008025
1987	0.007300	-0.000256	0.003498	0.008868
1988	0.004376	0.000131	0.003988	0.006910
1989	0.006495	-0.002348	0.004854	0.006659
1990	0.007621	0.000983		

16d2e7.6c66Fs10H

obs	WMI			
1970	2.606270	2.825288	3.679403	5.139627
1971	6.772518	8.366692	9.005583	8.088824
1972	8.127452	8.040427	8.399135	9.700909
1973	9.223194	8.378561	6.353409	5.189390
1974	5.462096	6.087687	5.865897	6.769701
1975	5.380007	5.595944	7.797296	7.397738
1976	8.105412	8.020068	6.752627	6.684826
1977	7.158846	6.976959	7.909853	8.552623
1978	8.902908	9.778944	9.928059	9.582827
1979	9.100351	9.052295	8.808770	7.649950
1980	7.082077	4.047569	5.282718	6.713709
1981	6.570688	8.852812	6.311112	4.775821
1982	6.206367	5.481056	5.875876	8.409550
1983	9.523475	11.60650	12.24059	10.21951
1984	8.671772	7.236692	6.026921	5.480204
1985	6.437015	7.069272	9.518599	10.88632
1986	10.71343	12.06555	12.61343	13.56990
1987	13.47185	11.95767	8.522593	5.991346
1988	3.912459	4.166533	4.650227	5.226000
1989	4.496799	1.833367	1.176876	2.089663
1990	2.698616	5.080806		

obs	WSTOCKR			
1970	-5.966205	-11.92838	-1.837145	5.195336
1971	9.925685	2.626766	-3.472652	-4.418567
1972	8.856003	3.616315	0.496383	1.542803
1973	-0.088045	-6.498669	-5.931795	-5.676753
1974	-8.958532	-8.187662	-17.66799	-9.944210
1975	14.36073	8.000482	-3.167839	0.981547
1976	9.352007	-1.264215	-0.685144	-4.698171
1977	-2.631645	-4.339324	-1.188719	-3.356574
1978	-5.779352	5.446298	5.667533	-4.254491
1979	-1.921336	-1.972038	2.051308	-3.867729
1980	-0.106664	-4.413833	8.574802	3.536232
1981	-4.574843	-2.032425	-6.510276	-4.498771
1982	-5.163458	-2.400821	-2.117056	16.52370
1983	8.296679	10.22211	1.473919	1.319209
1984	-2.955838	-3.386491	0.938451	3.175076
1985	6.463345	4.024228	1.708382	5.687484
1986	13.31588	8.346800	-0.605652	1.516515
1987	8.740124	3.736986	7.220405	-21.31082
1988	-3.034711	2.507308	2.169687	4.093152
1989	5.026991	5.878140	8.237997	-0.139818
1990	-0.718819	3.002738		

obs	POIL			
1970	0.395814	0.393665	0.386139	0.395328
1971	0.414894	0.409807	0.406603	0.406250
1972	0.394198	0.389873	0.387365	0.385185
1973	0.368132	0.372006	0.378145	0.407275
1974	0.530080	0.532946	0.554885	0.540210
1975	0.542274	0.568051	0.586674	0.595531
1976	0.567297	0.551479	0.563312	0.581008
1977	0.577731	0.569452	0.572160	0.586538
1978	0.587451	0.581295	0.586402	0.585411
1979	0.584410	0.597676	0.670421	0.746070
1980	0.814715	0.835725	0.842413	0.883488
1981	1.130419	1.155699	1.099394	1.086003
1982	1.049482	0.980962	0.977386	0.991695
1983	0.946861	0.917605	0.905605	0.900848
1984	0.891291	0.883051	0.881024	0.867032
1985	0.819561	0.817478	0.818182	0.819942
1986	0.652687	0.407346	0.388125	0.421123
1987	0.512389	0.534309	0.574598	0.536320
1988	0.467706	0.473239	0.411420	0.377266
1989	0.462440	0.522163	0.502966	0.516987
1990	0.551092	0.451895		